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EFFICIENCY OF BUPROLORD AS INSECT GROWTH REGULATOR (IGR), ALONE AND IN A MIXTURE OF *Ipomoea carnea* Jacq. EXTRACT AGAINST SPIDER MITE, *Tetranychus urticae* Koch (Acari: Tetranychidae)

A. H. Mohana [1]; M.M.H. Kandeel[1]; M.M. Eleawa[2] and S.G. Saleh[2] .
(1) Faculty of Technology & Development Zagazig University, Zagazig, Egypt.
(2) Plant Protection Research Institute, ARC, Dokki, Giza, Egypt.

ABSTRACT

The present study was conducted to evaluate the effect of buprolord as IGR against the two spotted spider mites (TSSM), Tetranychus urticae Koch. Also, the behavioristic action of mixture of buprolord and extract of Ipomoea carnea was included. A positive correlation between concentrations used and mortality percentages was recorded.

The idea was to try to reduce the extravagant of traditional pesticides. Buprolord was effective against T. urticae, protonymphs. When old eggs were treated with 250 ppm of the mixture kindly results were obtained. Mortality percentages were increased directly proportional with increasing concentration of buprolord. Old eggs of the mite, T. urticae were susceptible to the tested concentrations of buprolord during 72 hr. than in 24hr. where they were more sensitive. Concentration of 250 ppm on T. urticae old eggs gave 26.06/female. On the other hand, the lowest concentration of 25 ppm gave 65.61 eggs compared with 65.35 eggs for the untreated females.

The IGR used here extended the developmental period to T. urticae by delaying the developmental rate.

***Conclusively,** The present study was conducted to evaluate the effect of buprolord as IGR against the two spotted spider mites (TSSM),Tetranychus urticae Koch. Buprolord was effective against T. urticae, protonymphs. Old eggs of the mite, T. urticae were susceptible to the tested concentrations of buprolord during 72 hr. than in 24hr.. The IGR used here extended the developmental period to T. urticae by delaying the developmental rate.*

Keywords: Buprolord, I G. R., Ipomoea carnea, Extract, Tetranychus urticae**.**

INTRODUCTION

The two-spotted spider mite, *T. urticae* Koch is a major pest on field, glasshouse, horticultural, ornamental scrops and fruit trees (Van deVire*et*

al., 1972). It was considered one of the seriously sucking pests, feeds on more than 180 host plants causing damage in chlorophyll and produces white spots that eventually may become more or less coherent (Nachman & Zemek, 2002 and Sim *et al.* 2003).

The ability of *T. urticae* to develop resistance to several acaricides has caused problems in many countries involved in agricultural production during the recent 40 years (Herron &Rophail, 1998, Hinomoto & Takafuji 1995 and Stumpf & Nauen, 2001). The residual toxicity of the chemical neurotoxic insecticides on human and environment, control agents with comparative safety are searching by the entomologists. The systemic synthetic mimics of the insect hormones, which are best known as Insect Growth Regulators (IGRs) have been reported to be potent control agents against a number of pest insect of agriculture and fruit orchards (Fox, 1990). Among the IGRs, diflubenzuron and triflumuron are compounds which act as larvicides inhibiting larval molting; (Mulder and Gijswijt 1973) extend developmental time (Neumann and Guyer 1987) in different insect species. In addition, (Naher, *et al*. 2006) found that treating *T. urticae* with two IGRs, diflubenzuron and triflumuron significantly extended the duration periods of different developmental stages except deutonymph and adult. These compounds are non-toxic to non-target organisms.

Therefore, the present paper deals with the determination of the effects of buprolord 25% SC as anti-moulting on *T. urticae* immature stages and to study its effect as anti-moulting compound. Also, toxicological and biological aspects against *T. urticae* under laboratory conditions were recorded.

MATERIALS AND METHODS

Two spotted spider mite, *T. urticae* rearing:

A laboratory mite culture was initiated with 100 females and the same number of males collected from field. Population placed in rearing units or arenas (Helle and Overmeer 1985) in laboratory of Plant Protection Research Institute laboratory in Giza Governorate and maintained at 27±2ºC and 70±10% RH. Males and females were transferred to *Phaseolus vulgaris* leaf disks in Petri- dishes (10 cm in diameter). They were kept for a period of 24h to lay eggs. After this period, males and females were discarded and the eggs were reared until adult emergence.

Tested compound

Insect Growth Regulator (IGR)
Trade name: Buprolord 25% SC
Common name: (Buprofezin)**.**

Chemical name: 2-tert-butylimino-3-isopropyl-5-phenyl-1,3,5-thiadiazinan-4-one.
Plant extract*:* *Ipomoea carnea*

Buprolord 25% SC assessment

Nymphacidal action

The relative effect of pesticide, buprolord 25%SC on mortality of phytophagous mite, *T. urticae* was assessed in tests with 80 protonymphs of *T. urticae* (8 replicate with 10 mites per replicate) the protonymphs at the same age of laboratory reared mite colony were individually transferred by the aid of a camel's hair brush to leaf discs. The bean leaf discs with mites were sprayed with different concentrations of an aqueous solution of buprolord 25% SC, (250, 100, 50 and 25 ppm)that placed upper side down on moist cell cotton in Petri- dishes. Also, the same number of the protonymphs sprayed with distilled water was used as control, (Ebeling, 1960) technique. Mortality percentages of the individuals were evaluated at 24, 48 and 72 hrs. after treatment.

Ovicidal action.

The action of different concentrations of an aqueous solution of buprolord 25%SC, (250, 100, 50 and 25 ppm) was carried out on eggs of *T. urticae.* Mated adult females were placed on mulberry leaf discs in Petri-dishes on moist cotton for 24 hrs. Thereafter, when a sufficient number of eggs were laid the adult females were removed. 80 newly deposited eggs at 24hr old age and 80 eggs at 72 hrs. The disc surface carrying the eggs at ages ranged between 24 and 72 hrs, were gently dipped separately in each concentration for about 5 seconds according to Ebeling, (1960). In control test, the leaf discs were dipped in distilled water only. The treated eggs as well as the control were kept under constant temperatures of 27 ± 3ºC and relative humidity of 65 ± 5% R.H. In all cases, hatchability and mortality percentages were assessed.

Latent effect of LC_{50} of buprolord 25% SC on longevity and fecundity of adult females obtained from treated nymphs:

Eight adult mated females of *T. urticae*, were transferred to mulberry leave discs about (1.5 cm diameter) and replicated 10 times. The leaf dipping technique was applied as mentioned above. Mortality percentages for individual were calculated the survive individual were observed then the duration and fecundity of individuals also calculated.

Statistical analysis:

Data were subjected to statistical analysis using one way analysis of variance, ANOVA Duncan (1955).

RESULTS AND DISCUSSION

Toxicological effect of buprolord 25%SC against *T. urticae* nymphs:

Table (1) cleared that there was positive correlation between concentrations and mortality percentages. Buprolord was effective against *T.urticae*, protonymphs. Mortality percentages were increased gradually, (after 1 day of treatment till 3 days), with increasing the concentration of anti-molting, buprolord. After one day of treatment, the mortality percentages were 46.25, 35.00, 21.25 and 15.00 % for the successive concentrations 250, 100, 50 and 25 ppm, respectively. While, the previous concentrations gave 87.5, 66.25, 47.50 and 32.50 % accumulated mortality after 3 days for the previous same range. LC_{50} value after 72 hr. was 51.55ppm. These results were nearly similar with (Abdel-Hafez, *et al*., 2014) that revealed the JHM; pyriproxyfen has contact toxicity against different developmental stages of *T. urticae*.

Table 1: Toxicity of buprolord 25% SC against *T. urticae* protonymphs, during three time intervals.

Conc. (ppm)	Mortality after time% post treatment (hours)			LC_{50} ppm after 72 hrs.	Slop
	24 hr.	48 hrs.	72 hrs.		
250	46.25	62.50	87.50	51.55	1.59
100	35.00	50.00	66.25		
50	21.25	33.75	47.50		
25	15.00	27.50	32.50		
Control	1.25	1.25	2.50		

Ovicidal action:

The eggs of *T. urticae* were susceptible to the tested concentrations of buprolord after 72 hr., old eggs were more sensitive than 24hr. Table 2 and Figure 1 cleared that, 250 ppm was the most effective concentration during 24 and 72 hrs. Old eggs of *T. urticae* where, 25 ppm was the poorly effective of these concentrations. On the other hand, LC_{50} was 263.97 and 90.84 ppm for 24 and 72 hrs. Old eggs of *T. urticae*. On one word the poorly effect of the compound was deleted with slope value. Low slope value conformed that individuals showed homogeneity to the lasted compounds (Hoskins& Gordon, 1956). These results are agree with previous studies of El-Banhawy & Amer (1992), which indicated that TSSM eggs were susceptible to the tested concentrations of flufenoxuron. At lower concentrations, the percentage of survival increased up to 96% TSSM eggs (El-Banhawy and Reda, 1988) observed that dimilin, (anti-moulting) they lasted longer time to hatch and that effect was proportional to age of eggs of TSSM.

Table 2: Ovicidal activity after treated with buprolord 25% SC against different ages of *T. urticae*, during different times intervals.

Conc. (ppm)	24hr.old eggs		72 hrs. old eggs		LC_{50} (ppm)		Slop	
	Mortality %	Hatchability %	Mortality %	Hatchability %	24 hr. old eggs	72 hrs. old eggs	24 hr. old eggs	72 hr. old eggs
250	33.75	66.25	70.00	30.00	263.97	90.84	1.31	1.76
100	28.75	71.25	58.75	41.25				
50	15.00	85.00	37.50	62.50				
25	8.75	91.25	18.75	81.25				
Control	3.75	96.25	2.50	97.50				

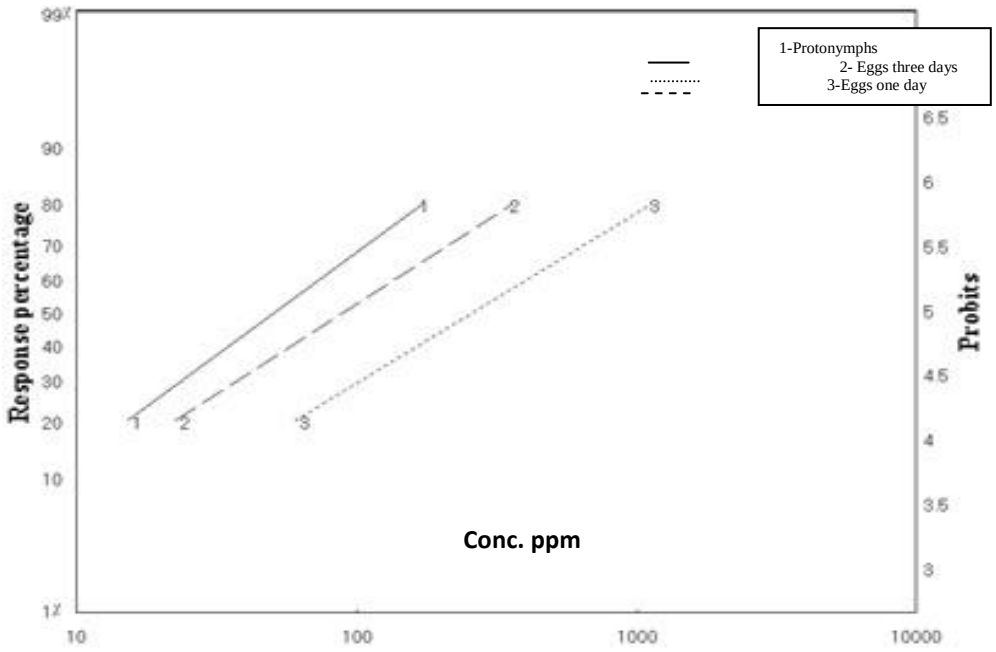

Figure 1: LC-P lines of buprolord 25% SC on protonymphs and eggs of *T. urticae*.

Data in Table (3) showed that all concentrations of buprolord reducing the longevity and fecundity of adult females of *T. urticae* compared with control. The longevity decreased to 11.21 days in highest concentration while, in lowest concentration 25ppm was less than control (14.55&20.42) days. The number of laid eggs was more decreased as concentration increased. The highest decrease in mean laid eggs was observed when the female treated

Table 3: Effect of buprolord 25%SC on some biological aspects of *T. urticae*.

Conc. (ppm)	Duration (days)			Longevity	Fecundity
	Pre-oviposition	Oviposition	Post-oviposition		
250	3.62±0.13	5.53±0.81	2.06±0.96	11.21±.93 [c]	26.06±2.11 [d]
100	2.91±0.09	7.11±0.76	3.25±0.76	13.27±1.10 [b]	3841±2.41 [c]
50	2.46±0.06	9.12±0.96	2.83±0.65	14.41±1.33 [b]	50.34±2.18 [b]
25	1.94±0.01	10.29±1.23	2.32±0.32	14.55±1.2 [b]	65.61±3.72 [a]
Control	1.50±0.09	15.98±2.11	2.94±0.18	20.42±3.18[a]	65.35±4.68[a]

Means in columns followed by the same letter are not significantly different at 0.05% level (Duncan's multiple range tests). ± Standard Error

with concentration 250 ppm. It gives 26.06 eggs compared with 65.35 eggs for untreated female. Our results agree with (Rani and Mohan,1998 and Akashe, 2004) who indicated that treatment with IGR, flufenoxuron increased the duration periods of developmental stages and affected reproduction of *T. urticae* females.

Data in Table (4) showed that the plant extract of buprolord 25% SC when mixed with to produce mixture for each with 1:1 vivol. The joint action was its components more toxic than in a separately forms for *T. urticae* nymph LC_{50} value of buprolord which mixed with LC_{50} of plant extract after 72 hr. after treatment are causing mortality percentages were; (97.50, 75.00, 55.00 and 40.00) for 250, 100, 50 and 25ppm, respectively. These results in harmony with those obtained by Waked, (2006) mixed plant extract, *Fagoina arabica* with vertimec against *T. urticae.*

Table 4: Toxicity of buprolord 25% SC in mixed with LC_{50} of *I. carnea* extract against *T. urticae* during three times intervals.

Conc. (ppm)	Mortality after time % post treatment (hours)			LC_{50} (ppm)	Slop
	24 hr.	48 hrs.	72 hrs.		
250	52.50	70.00	97.50	38.503	1.828
100	37.50	53.75	75.00		
50	30.00	43.75	55.00		
25	20.00	36.25	40.00		
Control	1.25	1.25	3.75		

Conclusively, The present study was conducted to evaluate the effect of buprolord as IGR against the two spotted spider mites (TSSM),*Tetranychus urticae* Koch. Buprolord was effective against *T. urticae*, protonymphs. Old eggs of the mite, *T. urticae* were susceptible to the

tested concentrations of buprolord during 72 hr. than in 24hr.. The IGR used here extended the developmental period to *T. urticae* by delaying the developmental rate.

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كفاءة البيبرولورد ٢٥% كمنظم نمو حشرى منفردا ومخلوطا مع مستخلص نبات *Ipomoea carnea* ضد الحلم العنكبوتى *Tetranychus urticae* Koch (Acari: Tetranychidae)

عبدالحميد حسين مهنا [1] - محمد محمد حسن قنديل[1] - محمد عليوه محمد[2] - جلال شعبان صالح [2]

* قسم الانتاج النباتى - كلية التكنولوجيا والتنمية - جامعة الزقازيق - مصر

** معهد بحوث وقاية النباتات - مركز البحوث الزراعية - الدقى-الجيزة - مصر

يهدف هذا البحث إلى تقييم فعالية أحد منظمات النمو الحشرية وهو البيبرولورد٢٥ % SC ضد الحلم العنكبوتى *Tetranychus urticae* Koch **وأظهرت النتائج أن:**

١- للمركب كفاءة عالية فى خفض تعداد حوريات الحلم المعاملة بتركيزات مختلفة منه حيث وجدت علاقة إيجابية بين التركيز ونسبة الموت حيث زادت نسبة الموت بزيادة التركيز.

٢- إستخدم منظم النمو ضد طور البيضة عمر ثلاث أيام وعمر يوم ووجد أن البيض عمر ثلاث أيام أكثر حساسية من البيض عمر يوم.

٣- جميع التركيزات المستخدمة من البيبرولورد زادت من فترة حضانة البيض المعامل مما أدى الى طول مدة دورة الحياة للحلم العنكبوتى مقارنة بالكنترول ، وقد أدت المعاملة بمنظم النمو الى تقليل مدة حياة الإناث المعاملة كما إنخفضت الكفاءة التناسلية حيث بلغ متوسط ما وضعته الآنثى عند تركيز ٢٥٠ جزء فى المليون كان ٢٦،٠٦ بيضه بينما كان ٦٥،٦١ بيضه عند اقل تركيز ٢٥ جزء فى المليون بينما كان ٦٥،٣٥ بيضه للأنثى الغير معاملة (الكنترول) .

٤- مما سبق يتضح أن مركب البيبرولورد أظهر تأثير ممتد المفعول وذلك بتأخير معدل التطور.

التوصية : نظرا للنتائج المتحصل عليها من استخدام منظم النمو البيبرولورد ٢٥% SC فى مكافحة الحلم العنكبوتى الاحمر حيث سبب نسب موت معنوية للحلم منفردا وبخلطه مع المستخلص النباتى***Ipomoea carnea*** ، بجانب انه زاد من زمن الوصول الى الطور البالغ عند معاملة البيض، لذا يوصى باستخدام هذا المركب فى برامج المكافحة المتكاملة لهذه الافة.